GM21 (Quantitative and Computational Finance)

Year: 2014–2015
Code: MATHGM21
Value: 15 UCL credits (= 6 ECTS credits)
Term: 1
Structure: 3 hour lectures per week
Assessment: 10% coursework & 90% examination
Lecturer: Dr R Ahmad

Course Description and Objectives

This is a course in the applied aspects of mathematical finance, in particular derivative pricing. The theme of the course is to develop the Partial Differential Equation approach to the pricing of options. Excel spreadsheets will be used for the computational work.

Recommended Texts


Detailed Syllabus


Financial Products and markets: Introduction to the financial markets and the products which are traded in them: Equities, indices, foreign exchange and commodities. Options contracts and strategies for speculation and hedging.


Computational Finance: Solving the pricing PDEs numerically using Explicit Finite Difference Scheme. Stability criteria. Introduction to Monte Carlo technique for derivative pricing.

Fixed-Income Products: Introduction to the properties and features of fixed income products: yield, duration & convexity; yield curves & forward rates; zero coupon bonds. Stochastic interest rate models; bond pricing PDE; popular models for the spot rate (Vasicek, CIR and Hull & White); solutions of the bond pricing equation. Calibration/yield curve fitting: the importance of matching theoretical and market prices; time dependent one factor models (Ho & Lee, extended Vasicek). Multi-factor interest rate modelling: Two-factor Interest rate models and Bond pricing equation.